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GENERAL ELECTRIC COMPANY  
GLOBAL RESEARCH  
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NISKAYUNA, NY 12309

EXAMINER
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HUNG, YUBIN

ART UNIT	PAPER NUMBER
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2624

NOTIFICATION DATE	DELIVERY MODE
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06/16/2008

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

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<b>Office Action Summary</b>	<b>Application No.</b> 10/064,620	<b>Applicant(s)</b> MUKHOPADHYAY ET AL.	
	<b>Examiner</b> YUBIN HUNG	<b>Art Unit</b> 2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 01 October 2007.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-8, 12-26, 31-33 and 35-38 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 14, 32, 33 and 35-38 is/are allowed.
- 6) ☒ Claim(s) 1-8, 12, 13, 15 20, 23-26, 31 and 33 is/are rejected.
- 7) ☒ Claim(s) 21 and 22 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 December 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>11/7/07, 5/21/08</u> . | 6) <input type="checkbox"/> Other: _____  |

***Response to Amendment/Arguments***

1. This action is in response to amendment filed 10/01/07, which has been entered.
2. Claims 9-11, 27-30 and 34 have been canceled. Currently claims 1-8, 12-26, 31-33 and 35-38 are still pending.
3. In view of Applicant's amendment, the 35 USC § 112 rejection of claim 36 has been withdrawn.
4. Applicant's arguments filed 10/01/07 have been fully considered and addressed below.
5. On P. 11 Applicant argues against the combinability of Tuy and Nishihara. The argument is not persuasive since concerns selection of image volume for further manipulation and Nishihara concerns selection of region of interest (as part of the compression process); both are pertinent to the problem with which the inventor was concerned. Applicant further argues that the recited portion of Nishihara does not teach/suggest/disclose the motivation to combine. This is not persuasive since it is well known in the art that for lower image quality lossy compression, which typically results in smaller image size (and thus reduce storage requirement), is typically used.

6. On P. 12 Applicant questions the relevance of Fig. 3C to claims 3 and 4. Note that Fig. 3C clearly shows frames corresponding to the selected portion. Therefore the argument is not persuasive.

7. On the argument regarding claim 5 (see pp. 12-13 of the response), note that the operator can use element 32 to select a portion as shown in Fig. 3A [Col. 5, lines 22-27]. Therefore the argument is not persuasive.

8. The arguments regarding allowed claims 14, 32, 33 and 35-38 are moot.

9. Regarding claim 13, Applicant's argument (bottom of P. 13) is not persuasive since Tuy discloses the use of a CT scanner or an MRI [Col. 4, lines 21-27].

10. On the argument regarding claim 23 (see p. 14 of the response), as discussed above the combination of Tuy and Nishihara is proper. The reason to combine is also proper as the advantage of lossy compression (higher compression ratio) is well known in the art, as Applicant admitted in paragraph 002 of the application. Therefore the argument is not persuasive.

11. Regarding claim 4 (P. 15), note that both Scorse and the combined invention of Tuy and Nishihara have aspects concerning compression. Therefore the combination is

proper and the reasons are as recited in the Office action mailed 06/01/07. Therefore the argument is not persuasive.

12. Regarding claim 6 (P. 16), Ransford discloses all its limitations. While it may have included additional steps, there is no teaching away. Therefore the argument is not persuasive.

13. Regarding claim 7 (P. 16), since Scorse discloses all of its limitations, Applicant's argument is not persuasive.

14. On P. 17 Applicant argued that Sutherland is not available because it has a filing date of 03/17/03 that is later than the filing date of 07/31/02 of the instant application. However, Sutherland has an effective filing date of 06/10/02 (provisional application, as Applicant clearly is aware of). Further, Sutherland discloses image acquisition, which is pertinent to the invention of the instant invention. On P. 18 Applicant further argued that there is no teaching in combining Sutherland (with the combined invention of Tuy and Nishihara) "to achieve its own stated function." However, the combination is to obtain the invention as specified in claim 15. Therefore the arguments are not persuasive.

15. Regarding claim 16 (see pp. 18-19 of the response), note that the portion of Sutherland [Paragraph 3, last 3 lines] recited in the 06/01/07 Office action discloses analyzing how dye traveled through the vessel. Since as dye travels a span of its

presence in the vessel is defined and a span has a beginning (when the dye appears) and an end (when the dye appears). Therefore the argument is not persuasive.

16. Regarding claim 17 (see p. 21 of the response), note that Applicant's invention also concerns compression, therefore the cited references are pertinent. Consequently the argument is not persuasive.

17. Regarding claim 18 (see p. 21 of the response), note that Scorse discloses having the operator manually select portions of an image [Col. 4, lines 35-37]. The teaching that is relied upon is for an operator to make the selection; that a plurality of frames is selected is disclosed/taught by the combined invention of Tuy and Nishihara (per the analysis of parent claim 17). Therefore the argument is not persuasive.

18. Regarding claim 19, no argument was presented.

19. Regarding claim 20 (see p. 22 of the response), note that selecting image portion is very pertinent to Applicant's invention and that not exposing to radiation provides advantage, and hence reasons to combine. Therefore the arguments are not persuasive.

20. Applicant's argument regarding claim 21 is persuasive therefore the 35 USC 103 rejection is withdrawn. The rejection of claim 22 is also withdrawn for the same reason.

(Note: the specific argument regarding claim 22 on pp. 23-24 of the response is not persuasive for the same reason as examiner's response to the argument regarding claim 18 above.) Claims 21 and 22 are now objected to as dependent upon a rejected base claim.

***Claim Rejections - 35 USC § 103***

21. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

22. Claims 1-3, 5, 12, 13, 23-26 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tuy et al. (US 5,297,043) and Nishihara et al. (US 4,903,317).

23. Regarding claim 1, and similarly claims 12, 24 and 31, Tuy discloses

- providing a span of interest for an acquired image sequence, wherein the span of interest defines a time sequence and a space sequence in the acquired image sequence that includes analytically relevant information in the acquired image sequence and excludes other information in the acquired image sequence  
[Fig. 1, refs. B (acquired image sequence), 20 & 32 (provides a span of interest as recited); Figs. 2 (acquired image sequence), 3A, 3B & 4; Col. 4, lines 66-68; Col. 5, lines 22-24; Col. 6, lines 23-25]

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- selecting a portion of the acquired image sequence in the span of interest, thereby selecting the analytically relevant information and sacrificing the other information  
[See the analysis above]
- displaying the analytically relevant image sequence, thereby displaying the analytically relevant information without the other information  
[Fig. 1, ref. C; Col. 5, lines 22-24]

Tuy does not expressly disclose that the selected portion is losslessly compressed and decompressed.

However, Nishihara discloses losslessly compressing and decompressing region of interest (ROI) of image data. [Figs. 9 (compress) & 10 (decompress); Col. 8, lines 36-45; Col. 9, lines 30-53. Note that the analytically relevant portion of each image in the sequence is an ROI of that image.]

Tuy and Nishihara are combinable because they are from the same field of endeavor of selecting image portion.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify Tuy with the teaching of Nishihara by applying lossless compression to the selected portion. The motivation would have been to reduce the storage requirement while preserving the fidelity of the important portion, such as the diseased portion of medical images, as Nishihara indicates in Col. 8, lines 35-43.



Therefore, it would have been obvious to combine Nishihara with Tuy to obtain the invention as specified in claim 1.

24. Regarding claims 2, 3, and similarly claims 25 and 26, Tuy further discloses

- **(claims 2 & 26)** wherein the portion of the acquired image sequence is a plurality of frames in a span of interest  
[Fig. 3C]
- **(claims 3 & 25)** wherein the portion of the acquired image sequence is at least one frame in a span of interest  
[Fig. 3C]

25. Regarding claim 5, the combined invention of Tuy and Nishihara further discloses

- wherein selecting the portion of the acquired image sequence comprises using a user to select option for selecting the portion of image  
[Tuy: Fig. 1, ref. 32]

26. Regarding claim 13, Tuy further discloses

- wherein the imaging device is a medical imaging device selected from a magnetic resonance imaging system, a computed tomography system, an x ray system, an x ray angiogram system and an ultrasound system  
[Fig. 1; ref. A and Col. 4, lines 21-27 (CT scanner or MRI)]

27. Claim 23 is similarly analyzed and rejected as per the analysis of claim 1 and additionally the fact that lossy compression methods are well-known conventional compression methods and the motivation would have been because they generally have a higher compression ratio than lossless techniques and are preferred when compressed image size is the more important factor. [For example, as admitted in paragraph 0002 of the application.]

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28. Claims 4 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tuy (US 5,297,043) and Nishihara (US 4,903,317) as applied to claims 1-3, 5, 12, 13, 23-26 and 31 above, and further in view of Scorse et al. (US 5,128,776).

29. Regarding claim 4, the combined invention of Tuy and Nishihara discloses all limitations of its parent, claim 1.

Scorse discloses the following limitation that is not expressly disclosed in the combined invention of Tuy and Nishihara:

- archiving the analytically relevant image sequence  
[Fig. 1, ref. 34, 38; Col. 4, lines 20-22]

The combined invention of Tuy and Nishihara is combinable with Scorse since they have aspects that are from the same field of endeavor of compression.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the combined invention of Tuy and Nishihara with the teaching of Scorse by archiving relevant image sequence. The motivation would have been to have important data preserved for later use or review.

Therefore, it would have been obvious to combine Scorse with Tuy and Nishihara to obtain the invention as specified in claim 4.

30. Regarding claim 7, the combined invention of Tuy and Nishihara discloses all limitations of its parent, claim 5. In addition, Scorse further discloses

- wherein the user select option comprises manually marking frames of interest [Fig. 1, ref. 18; Col. 4, lines 35-37]

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31. Claims 6 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tuy (US 5,297,043) and Nishihara (US 4,903,317) as applied to claims 1-3, 5, 12, 13, 23-26 and 31 above, and further in view of Ransford et al. (EP 479,563 A2).

32. Regarding claim 6, the combined invention of Tuy and Nishihara discloses all limitations of its parent, claim 5.

The combined invention of Tuy and Nishihara does not expressly disclose the following, which is taught by Ransford:

- wherein the user select option comprises segmenting an identifiable anatomy of a patient [Col. 11, lines 28-32]

The combined invention of Tuy and Nishihara is combinable with Ransford since they have aspects that are from the same field of endeavor of medical image processing (specifically, X-ray and ultrasound images).

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the combined invention of Tuy and Nishihara with the teaching of Ransford as recited above. The motivation would have been to locate the part (e.g., thorax) of a patient that is of interest, as Ransford indicates in Col. 11, lines 29-31.

Therefore, it would have been obvious to combine Ransford with Tuy and Nishihara to obtain the invention as specified in claim 6.

33. Regarding claim 8, Ransford further discloses

- wherein the user select option comprises sketch-gripping an image boundary [Col. 11, lines 28-32]

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34. Claims 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tuy (US 5,297,043) and Nishihara (US 4,903,317) as applied to claims 1-3, 5, 12, 13, 23-26 and 31 above, and further in view of Sutherland et al. (USPUB 2005/0277823 A1)).

35. Regarding claim 15, per the analysis of claim 1 the combined invention of Tuy and Nishihara disclose

- providing a span of interest for the images obtained by (an imaging device), wherein the span of interest defines a time sequence between two time instances that includes analytically relevant information in the acquired image sequence and excludes other information in the acquired image sequence

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- selecting a plurality of frames of interest in the span of interest, thereby selecting the analytically relevant information and sacrificing the other information
- applying lossless compression to the plurality of frames of interest and obtaining therefrom a compressed image sequence
- applying decompression to the compressed image sequence and obtaining therefrom an analytically relevant image sequence
- displaying the analytically relevant image sequence, thereby displaying the analytically relevant information without displaying the other information

(Note that since each image in the span of interest is 2-dimensional, a the portions of the images corresponding to the span of interest corresponds to a space sequence.)

The combined invention of Tuy and Nishihara does not expressly disclose that the frames are obtained from an x-ray angiogram.

However, Sutherland discloses capturing x-ray angiograms (as image frames) and comparing a series of angiograms over a time period (i.e., between two time instances) for diagnostic purpose [Figs. 6A-6C, 7A, 9A, 9B; Abstract; Paragraphs 3, 12, 41-45, 56, 69, 70].

The combined invention of Tuy and Nishihara is combinable with Sutherland since they have aspects that are from the same field of endeavor of image acquisition.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the combined invention of Tuy and Nishihara with the teaching of Sutherland by using x-ray angiograms over a time period (for diagnostic purpose). The motivation

would have been to be able to track vascular intervention site, as Sutherland indicates in paragraph 12.

Therefore, it would have been obvious to combine Sutherland with Tuy and Nishihara to obtain the invention as specified in claim 15.

36. Regarding claim 16, Sutherland further teaches/suggests a span for analysis as the span when the dye is present, i.e., begins when the dye appears and ends when it disappears [Paragraph 3, last 3 lines].

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37. Claims 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tuy (US 5,297,043) and Nishihara (US 4,903,317) as applied to claims 1-3, 5, 12, 13, 23-26 and 31 above, and further in view of Chui et al. (US 5,841,473).

38. Per the analysis of claim 15, the combined invention of Tuy and Nishihara discloses all limitations of claim 17 except for the imaging device, which is an MRI for claim 17.

However, Chui discloses compressing MRI image sequences [Col. 6, lines 36-44].

The combined invention of Tuy and Nishihara is combinable with Chui since they have aspects that are from the same field of endeavor of image compression.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the combined invention of Tuy and Nishihara with the teaching of Chui by compressing MRI image sequences. The motivation would have been because such images are frequently acquired in medical procedures and the reduction of their size (by compression) can save the storage cost.

Therefore, it would have been obvious to combine Chui with Tuy and Nishihara to obtain the invention as specified in claim 17.

39. Regarding claim 18, note that manually selecting frames is well known and practiced in the art. [For example, per the analysis of claim 7, Scorse discloses manual selection of the frames of interest.]

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40. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tuy (US 5,297,043) and Nishihara (US 4,903,317) and Chui et al. (US 5,841,473) as applied to claims 17 and 18 above, and further in view of Reinsch (US 5,134,661).

Regarding claim 19, the combined invention of Tuy, Nishihara and Chui discloses all limitations of its parent, claim 17.

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The combined invention of Tuy, Nishihara and Chui does not expressly disclose that the frames of interest in a space sequence are automatically selected using edge detection.

However, Reinsch suggests using edge detection to select areas of interest. [Abstract: lines 1-9.]

The combined invention of Tuy, Nishihara and Chui is combinable with Reinsch since they have aspects that are from the same field of endeavor of image processing.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the combined invention of Tuy, Nishihara and Chui with the teaching of Reinsch by using edge detection to select areas of interest. The motivation would have been because edge detection produces edge points that can be processed to obtain the contours of regions of interest.

Therefore, it would have been obvious to combine Reinsch with Tuy, Nishihara and Chui to obtain the invention as specified in claim 19.

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41. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tuy et al. (US 5,297,043), Nishihara et al. (US 4,903,317) and Zanelli (US 6,515,657).



42. Regarding claim 20, per the analysis of claim 1 the combined invention of Tuy and Nishihara discloses

- providing a span of interest for the images obtained by (an imaging device), wherein the span of interest defines a time sequence and a space sequence in the acquired image sequence that includes analytically relevant information in the acquired image sequence and excludes other information in the acquired image sequence
- selecting at least one frame of interest in the span of interest, thereby selecting the analytically relevant information and sacrificing the other information
- applying lossless compression to the at least one frame of interest and obtaining therefrom a compressed image sequence
- applying decompression to the compressed image sequence and obtaining therefrom an analytically relevant image sequence
- displaying the analytically relevant image sequence, thereby displaying the analytically relevant information without displaying the other information

The combined invention of Tuy and Nishihara does not expressly disclose that the imaging device is an ultrasound device.

However, Zanelli discloses using an ultrasound device to acquire image data. [Abstract; Fig. 6, ref. 50; Col. 28-30.]

The combined invention of Tuy and Nishihara is combinable with Zanelli because they are from the same field of endeavor of selecting image portion.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the combined invention of Tuy and Nishihara with the teaching of Zanelli by using an ultrasound device for image acquisition. The motivation would have been

because ultrasound device does not expose patients or medical personnel to radiation, as Zanelli indicates in Col. 2, lines 18-26.

Therefore, it would have been obvious to combine Zanelli with Tuy and Nishihara to obtain the invention as specified in claim 20.

### ***Allowable Subject Matter***

43. Claims 14, 32, 33 and 35-38 as amended are allowed.

44. The following is a statement of reasons for the indication of allowable subject matter:

45. Regarding claim 14, and similarly claim 32, closest art of record, alone or in combination, do not disclose, teach or fairly suggest using a collimator ring for defining the space sequence.

### ***Conclusion and Contact Information***

46. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

47. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

48. Any inquiry concerning this communication or earlier communications from the examiner should be directed to YUBIN HUNG whose telephone number is (571)272-7451. The examiner can normally be reached on 7:30 - 4:00. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew C. Bella can be reached on (571) 272-7778. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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49. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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June 9, 2008